8600 Series Limited Express DC EMU for Shikoku Railway Company

After the 8600 Series limited express DC EMUs were put into service in the Takamatsu–Matsuyama section in June 2014, the same EMUs were put into service in the Okayama/Takamatsu–Matsuyama section in March 2016.

These cars replaced the 2000 Series limited express diesel railcars that had operated as the Limited Express "Shiokaze" and "Ishizuchi," fulfilling the role of the limited express system for the Yosan Line. This is the first new production of limited express EMUs for the Shikoku Railway Company in 21 years. These cars incorporate state-of-the-art technologies, including a carbody tilting control system and LED room lights to reduce costs, save energy and help preserve the environment. Kawasaki manufactured and delivered four pre-volume production cars and 10 volume production cars.

Introduction

Shikoku Railway Company had been planning to reorganize the rolling stock for the limited express service in the electrified section of the Yosan Line, which connects Takamatsu with Matsuyama, to only consist of EMUs in order to reduce costs and replace the aging Series 2000 limited express diesel railcars.

In addition, the company wanted to have the new cars serve as a guide for the limited express cars to be introduced in the future. For example, the company demanded that amenities such as cabins and sanitary facilities reflect passenger needs so that the new cars would set the standard for the future limited express service on the Yosan Line along with the conventional 8000 Series EMUs.

1 Train formation

In order to ensure finely tuned car scheduling according to the passenger load status, each EMU is made up of two train sets or three train sets when a middle car is connected between the two drive cars.

Half of the front car cabin of a three-train set EMU bound for Matsuyama is used as a Green Seat cabin where the seats are arranged in rows consisting of two seats on one side and a single seat on the other.

Kawasaki undertook the production of all four of the pre-volume production cars (2 train sets × 2 train sets) and 10 volume production cars (2 train sets × 2 train sets plus 3 train sets × 2 train sets).

2 Features

(1) Design concept

The 8600 Series limited express DC EMU has been designed to be a futuristic limited express train with a nostalgic image based on a retrofuturism design concept. The cars were jointly designed by Shikoku Railway Company and our Design Division.

(2) Exterior design

The train's forcefulness and dynamism are expressed by the circular black face of the front end in the motif of a steam locomotive. The carbody is painted orange and green, conjuring images of gentle and beautiful nature in Shikoku – Kagawa and the warm climate in coastal areas of the Seto Inland Sea – Ehime. Also, the carbody has a streamlined shape, suggestive of the speed of a limited express train.

(3) Interior design

Well-lit and elegant cabin space that conjures up images of the future with orange and green accents that give the cabin interior a sense of natural warmth creating a sophisticated atmosphere for passengers to soak in (Figs. 1 and 2).

Fig. 1 Green car cabin

(a) Color representing Kagawa

(b) Color representing Ehime

Fig. 2 Ordinary car cabin

(4) Interior facilities

Cabins are equipped with electrical outlets for use with PCs or ohter devices on every seat, including those in ordinary cars, large baggage racks built according to the airline standard for carry-on baggage, emergency warning devices with communication functions, and so forth. Cabin lights use Kawasaki's straight tube LED lamps (Fig. 3), which save energy and reduce the need for maintenance.

LED downlights are also used on each deck and security cameras are located at each door.

Barrier-free arrangements include voice guidance devices and indication lamps interfaced with the opening and closing of side sliding doors.

(5) Comfort and ride quality

The air spring carbody tilting method developed by Kawasaki is used to improve the speed in a curve (Fig. 4). In this system the pressure in the outer air spring is increased in accordance with the tightness of each curve, which causes the carbody to tilt inward to cancel the centrifugal force.

Fig. 3 Self-powered straight tube LED lamp

† Compared with fluorescent lamps these lamps cut power consumption by 55% and weigh 75% less. Conversion to LED limits waste since LED lamps are suitable for existing fluorescent lamp fixtures.

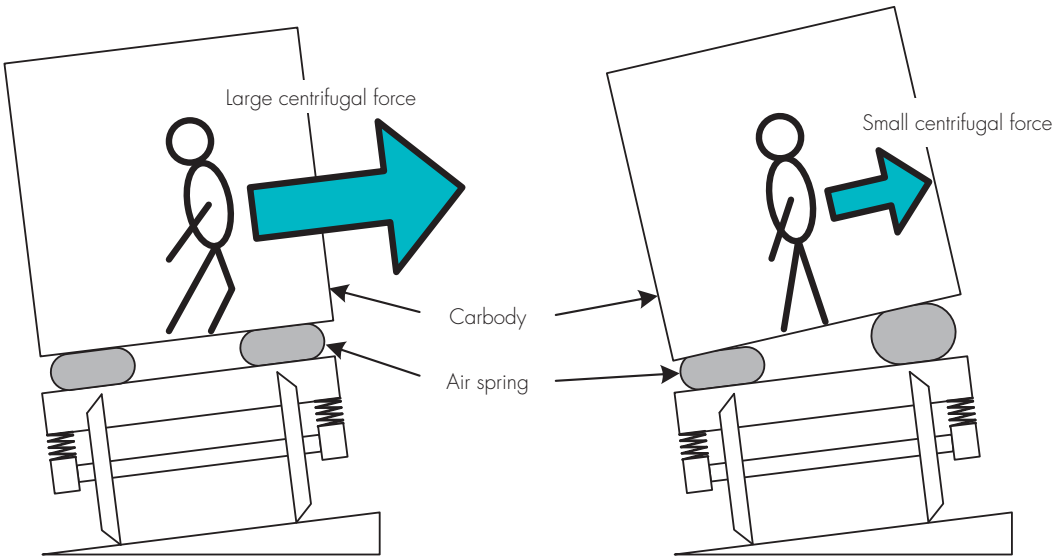

Fig. 4 Carbody tilting

(6) Bogies

Lightweight bolsterless bogies equipped with a carbody tilting system are used to ensure an operating speed of up to 130 km/h (maximum design speed: 140 km/h).

Conclusion

The order for the production of 8600 Series limited express DC EMUs was our first order from Shikoku Railway Company. We will endeavor to make the most of what we learned from the recent production of the EMUs so as to further increase orders from Shikoku Railway Company in the future.

Kazuyoshi Kitaya

Contact
Engineering Department,
Engineering Division,
Rolling Stock Company
Tel: +81-78-682-3143 Fax: +81-78-682-3158